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OCTOBER 1984

ESTIMATED U.S. PETROLEUM BALANCE

SUMMARY

October's increase in total domestic products supplied over the year-earlier level was 2.6%, slightly higher than the percentage increase experienced in September. Demand for gasoline, kerosine jet fuel, and "other oils" was ahead of last year's, but distillate demand declined slightly. With prices for major products showing few significant changes, the recent somewhat-lower rates of year-to-year increases in total product demand seem to reflect the slower growth of the economy since midsummer.

Crude production showed only a minimal plus in October. Imports rose more than 11%. Inventories rose about 17 million barrels in October, twice their normal seasonal rise.

Rig activity increased about 5% over last October's level. The number of wells reported drilled in September rose more than 16% over year-earlier levels. October data are not yet available.

PRODUCTS SUPPLIED[1/]

Gasoline

DELIVERIES UP LESS THAN 1%. The level of gasoline deliveries rose a minimal 55 MBD (0.8%) in October over last year's. As detailed later in this Report, higher gasoline demand is in rising proportion being satisfied by sizable increases in gasoline imports.

Gasoline prices at the pump were virtually unchanged in October from the prior month's level. Adjusted for inflation, they were, however, about 25% below the 1981 highs. These lower prices have been, of course, a major contributing factor to the fall in spot crude prices and the recent downward pressure on official OPEC crude prices.

The lower price levels, aided by a roughly 7% increase in real disposable income since last year, have helped to strengthen gasoline demand. Recent slowing of economic activity from high early-1984 levels has acted as an offsetting factor to the price/disposable income effects. Increases in engine efficiency have also had a dampening effect, though the roughly 4½% average efficiency increase (represented by "miles per gallon" improvements) experienced during the 1979-1982 period fell by more than a third, to 2.8%, in the 1982-1983 interval. The latest improvement in engine efficiency lowered gasoline demand by about 150 MBD, even after adjusting for additional miles driven because of lower effective costs per mile.

Unleaded gasoline's share of the total motor gasoline market rose to almost 61%, up 4.4 percentage points over last October but minimally below September's increase. New car sales have been running some 10% ahead of last year, adding gradually to the growth in unleaded gasoline's share of the gasoline market.

Distillates

DELIVERIES DOWN ABOUT ½%. Deliveries of distillate fuel oil fell 14 MBD (0.5%) below October 1983's level, a month in which deliveries were running more than 100 MBD below the then-prevailing trend. Last month was the warmest October since 1971.

The impact of weather on distillate consumption is not large at this time of year, but the fact that this October was 17% warmer than last year still is likely to have reduced demand by 40-50 MBD. In addition, petroleum price uncertainty in world markets has had a negative impact on filling of distributor storage of distillates.

Truck and railroad traffic levels are also undergoing major changes. Truck traffic increases, in "teen" percentages early in the year, slackened to 2% in September and are estimated to have remained at essentially the same level in October. Railroad traffic fell some 7% in October. The total of "on-highway" and railroad diesel deliveries thus is likely to have been about equal to last year's level.

Residual Fuel Oil

DOWN ALMOST 9%. Residual fuel oil fell 107 MBD (8.6%) from October 1983 levels. Bunker fuel deliveries apparently still have not returned to prior-year levels. In August, the most recent month for which data are available, heavy fuel oil laden on vessels engaged in worldwide trade rose minimally; for the first 8 months of 1984, however, such bunker fuel purchases - a large share of total bunker fuel supplied - are estimated to have averaged about 30 MBD less than in the corresponding 1983 period.

Use by the electric utilities fell about 60 MBD on average for July and August combined. The September/October swing-over of seasons saw a cooler September than last year and warmer October—both tending to reduce electricity needs. Electricity generation rose only an estimated 2½% over last year during the September/October period, while year-to-year increases for the prior eight months had been at more than twice that rate. In addition, petroleum's share of energy consumed to produce electricity has continued to slide.

While use of residual fuel oil in the industrial sector had been showing some signs of revival, recent year-to-year increases were to a large degree the result of a general downtrend in the industrial sector's residual fuel oil demand that did not show signs of reversal until last October. But available data indicate that, even against still-low 1983 levels, August deliveries (latest applicable data) showed a surprisingly high rate of decline. Lower third-quarter economic growth, such as indicated by recent drops in year-to-year industrial production increases to about half early-1984 levels, likely contributed to the lowering of industrial sector purchases in succeeding months.

Overall, natural gas prices have been relatively stable over the past year, though prices to industrial customers have shown slight declines. Residual fuel oil prices, after declining in July and early August, rallied in late August and September. They experienced only minor changes early in October, though weakness developed later in the month. The resultant lack of any decisive incentive continued to hold switching between these two products by industrial users to a minimum.

Kerosine Jet Fuel

UP 21% OVER LAST OCTOBER. Kerosine jet fuel deliveries rose 173 MBD (21.1%) over year-earlier levels to the highest level for any month in recent history.

Kerosine jet fuel prices recently have been about 2¢/gallon below year-ago price levels. While October data on "miles flown" are not yet available, air traffic most likely continued to grow at the same 9%-10% as in recent months, partly in response to the availability of incentive fare offerings. The large October increase may also be related to the desire of operating companies at airports not served by direct pipelines, or not in close proximity to refining centers, to replenish storage.

Other Oils

UP 7% OVER OCTOBER 1983. Other oils are estimated to have been supplied at a 6.8% higher rate in October. Road building activity is at higher levels. While chemical industry sales also continue to be strong, they have shown lesser gains recently, and rising imports have been making steady inroads into the domestic market.

(In millions of B/D)	OCTOBER ESTIMATES			YEAR-TO-DATE ESTIMATES		
	1984	1983	% Change	1984	1983	% Change
—Total domestic products supplied	15.4	15.0	2.6	15.8	15.1	4.8
—Motor gasoline supplied	6.6	6.6	0.8	6.7	6.6	1.7
—Distillate fuel oil supplied	2.6	2.6	(0.5)	2.8	2.6	9.0
—Residual fuel oil supplied	1.1	1.2	(8.6)	1.4	1.4	(0.3)

SUPPLY[1/]

Total supply exceeded last October's level by 548 MBD, essentially as a result of higher imports (563 MBD).

Production

ABOUT EVEN WITH OCTOBER'S LEVEL. October crude oil production exceeded last year's only minimally (5 MBD). Despite a boost from additional production at Kuparuk as a second production facility was brought on stream, total Alaskan production was slightly below last October's. Lower 48 output continued to hold above year-earlier levels, though a disproportionate part of output increases has been in states with lesser base production levels, some evidence of a shift towards newer production regions. Total lower 48 production levels have exceeded 7 million barrels per day since spring.

Imports

UP 11% OVER OCTOBER 1983. Imports rose 563 MBD (11.1%) over last year's. This is a departure from the lower levels of imports in the third quarter and in contrast to last October's below-trend levels.

The volume of imports for short-term periods often varies significantly from underlying trends as a result of uncertainty about future world supply and prices. For the third quarter, for example, import levels were depressed because of substantial price and production fluctuation during the summer. When relative stability was attained towards the end of September and in early October, purchases were apparently stepped up, with oil starting to reach the U.S. in October.

Distillate imports were about one-third higher in October than last year's level. Gasoline imports exceeded last October's level by 8% and for the year to date have exceeded last year's levels by about 50 MBD, or roughly 20%. There has also been some concern that import figures reported by the Department of Energy and the API may understate gasoline imports by between 30 and 50 thousand barrels per day. This results from the possible failure of some gasoline importers to report their product imports to DOE and API, and definitional problems in product classification which may make it difficult to distinguish these imports from chemical and related imports.

Mexico continued to be the largest source of imports into the U.S., followed by Canada, Venezuela, and Saudi Arabia.

Inventories

UP 17 MM BBLS. FROM THE SEPTEMBER LEVEL. Inventories rose about 17 million barrels in October from the September total, roughly twice the average seasonal change. The increase is the result of higher crude, gasoline, and distillate inventories.

Crude inventories, largely as a result of crude imports some 250 MBD over September levels, rose about 3 million barrels to 334 million barrels, minimally below the 340-360 million barrel range that has prevailed for almost three years. Distillate inventories rose about 12 million barrels in October, three times the normal seasonal rise. Stock levels on the East Coast, the major heating oil consuming region, rose a very substantial 15 million barrels in October.

Gasoline inventories rose about two million barrels, the first October increase since 1973, as a result of substantial production levels arising from continued build-up of distillate stocks. Meanwhile, the gasoline demand increase was minimal. Gasoline inventories represent 35 days of supply, slightly above average for this time of year.

An article starting on page 5 discusses changes in inventory and demand seasonalities for motor gasoline and distillates and likely causes and implications of these changes.

Refinery Operations

UTILIZATION AT 76%. Refinery utilization, at 76%, was almost three percentage points higher than last October's as a result of higher input and lower operable capacity. Input to distillation units rose some 260 MBD, while capacity fell a roughly equal amount.

Exploration

RIGS UP 5%, WELL NUMBERS ALSO ROSE. Rig activity rose 5% in October over year-earlier levels, and recent activity has not been significantly higher than earlier in the year, when adjusted for seasonal variations. Wells reported drilled rose 16% in September over year-earlier levels. October data are not yet available.

(In millions of B/D)	OCTOBER ESTIMATES			YEAR-TO-DATE ESTIMATES		
	1984	1983	% Change	1984	1983	% Change
—Total supply	16.6	16.1	3.4	16.5	15.7	4.9
—Crude production[2/]	8.8	8.8	0.1	8.8	8.7	1.1
—Crude oil imports[3/4/]	3.7	3.2	14.1	3.3	3.1	5.2
—Product imports	1.9	1.8	5.9	2.0	1.7	16.8

1/ Total supply, i.e., production plus imports adjusted for net stock change is equal to total products supplied from primary storage. Total products supplied from primary storage less exports is equal to total domestic products supplied. Information contained in this report is derived from information published in the API Weekly Bulletin and is based on historical analysis of the industry. All data reflect the most current information available to the API and include all previously published revisions.

2/ Includes lease condensate.

3/ Beginning with January 1977, the U.S. Department of Energy began reporting crude oil imports as of the date of importation. Previously, this data, with the exception of Canadian crude imports, was reported as of the date it was received at the refinery. This change may affect both the level of crude oil imports and crude oil stocks. API estimates of these data may, therefore, differ slightly from those of the U.S. Department of Energy.

4/ API data do not include crude oil imported for the Strategic Petroleum Reserve (SPR) nor crude oil stocks held in the SPR (according to the U.S. Department of Energy, the SPR held approximately 437 million barrels as of October 31, 1984).

ESTIMATED UNITED STATES PETROLEUM BALANCE

(Daily Average in Thousands of 42 Gallon Barrels)

Products Supplied/Supply From Primary Storage	OCTOBER			YEAR-TO-DATE		
	1984[1]	1983[2]	% Change	1984[3R]	1983[2]	% Change
Products Supplied:						
Total motor gasoline	6,643	6,588	0.8	6,710	6,601	1.7
Finished leaded motor gasoline*	2,609	2,877	(9.3)	2,761	2,991	(7.7)
Finished unleaded motor gasoline*	4,034	3,711	8.7	3,949	3,610	9.4
Naphtha-jet	229	179	27.9	226	209	8.1
Kerosine-jet	993	820	21.1	940	827	13.7
Distillate fuel oil	2,597	2,611	(0.5)	2,838	2,603	9.0
Residual fuel oil	1,136	1,243	(8.6)	1,406	1,410	(0.3)
All other oils[4]	3,940	3,690	6.8	3,873	3,564	8.7
Reclassified[5]	- 187	- 168	11.3	- 213	- 160	33.1
Total domestic products supplied	15,351	14,963	2.6	15,780	15,054	4.8
Exports	709	576	23.1	698	755	(7.5)
Total products supplied	16,060	15,539	3.4	16,478	15,809	4.2
Supply:						
Domestic production:						
Crude oil[6]	8,776	8,771	0.1	8,802	8,709	1.1
Natural gas liquids	1,659	1,604	3.4	1,626	1,552	4.8
Other supply[7]	548	623	(12.0)	821	666	23.3
Total domestic supply	10,983	10,998	(0.1)	11,249	10,927	2.9
Imports:						
Crude oil, total	3,700[10/]	3,244[10/]	14.1	3,259[10/]	3,097[10/]	5.2
Canadian	253	279	(9.3)	319	269	18.6
Other	3,447	2,965	16.3	2,940	2,828	4.0
Products, total	1,919	1,812	5.9	1,982	1,697	16.8
Residual fuel oil	540	638	(15.4)	694	696	(0.3)
Other	1,379	1,174	17.5	1,288	1,001	28.7
Total imports	5,619	5,056	11.1	5,241	4,794	9.3
Total supply	16,602	16,054	3.4	16,490	15,721	4.9
Stock change, all oils	+ 542	+ 515	XXXX	+ 12	- 88	XXXX
Refinery Operations						
Input to crude oil distillation units	12,231	11,972	2.2	12,255	11,973	2.4
Operable capacity	16,074	16,320	(1.5)	16,098	16,733	(3.8)
Refinery utilization (%)[8]	76.1%	73.4%	3.7	76.1%	71.6%	6.3
Crude oil runs	12,103	11,782	2.7	12,096	11,700	3.4

Stocks (millions bbls.)	1984		1983[2]	% Change from ...	
	Oct. 31[9]	Sep. 30[9]	Oct. 31	Previous Month	Year Ago
Crude oil [10/]	333.6	330.3r/	348.9	1.0	(4.4)
Unfinished oils	110.7	109.1r/	112.2	1.5	(1.3)
Total motor gasoline**	230.5	228.5r/	227.4	0.9	1.4
Finished leaded motor gasoline*	82.8	84.5	93.7	(2.0)	(11.6)
Finished unleaded motor gasoline*	108.7	105.2	93.4	3.3	16.4
Naphtha-jet	6.5	6.9	6.0	(5.8)	8.3
Kerosine-jet	40.2	38.9	37.2	3.3	8.1
Distillate fuel oil	155.1	143.0r/	162.6	8.5	(4.6)
Residual fuel oil	50.9	47.5	51.2	7.2	(0.6)
All other oils	150.7	157.2r/	194.8	(4.1)	(22.6)
Total all oils	1,078.2	1,061.4r/	1,140.3	1.6	(5.4)

1/ Based on API estimated data converted to a monthly basis.
2/ Source: U.S. Department of Energy.
3/ Source: January-August, U.S. Department of Energy, September-October, API.
4/ Includes crude losses.
5/ Beginning with January 1981, U.S. Department of Energy began using a new data collection system which encompasses a method to ascertain the amount of product reclassified during the production phase. So that there will be no double counting of these volumes, they are subtracted from total domestic products supplied.
6/ Includes lease condensate.
7/ Includes Unaccounted-for crude oil, Refinery input of other hydrocarbons, and Processing gain.
8/ Represents "Input to crude oil distillation units" as a percent of "Operable capacity."
9/ Derived by interpolating API weekly stocks data.
10/ Data do not include oil imported for the Strategic Petroleum Reserve (SPR) nor crude oil stocks held in the SPR.
R/ Revised.
* Included in motor gasoline.
** Includes finished leaded, finished unleaded, and motor gasoline blending components stocks.

DEVELOPMENTS IN SEASONAL PATTERNS OF MAJOR PETROLEUM PRODUCTS

This article discusses developments in seasonal patterns for product supplied and stock changes for motor gasoline and distillate over the last 15 years. It concludes that motor gasoline supplied, after declining in seasonality through the 1970's, may be stabilizing or even regaining some of its seasonal variability; this may be at least in part because of price effects. The seasonal range of distillate supplied, as might be expected from the reduced market share for heating oil over the period, has declined markedly. However, the rate of decline has lessened. Finally, it concludes that the interpretation of seasonal stock changes and stock levels requires caution, since much non-seasonal variability and flexibility exists.

Product Supplied Seasonal Patterns

Figure 1-A shows the seasonal pattern of motor gasoline supplied from 1970 to the present as estimated by the widely used Census X-11 method. As is apparent in the graph, the method allows for gradually-changing patterns over time. Figure 1-B shows the estimated seasonal factors in more detail for selected years.

As the first figure shows, the seasonal pattern began to narrow in the early seventies, continuing to lessen until 1980 or 1981. (Because this seasonal adjustment procedure is based on moving averages over several years, a shift in seasonal pattern cannot be meaningfully pinpointed to a specific year.) Since that time it has been relatively stable and perhaps has even increased slightly.

It is believed that at least part of this behavior is due to the differential effects of real prices on different types of driving. Since the additional driving (e.g., recreation and travel) in the summer peak period tends to be less price-inelastic than driving in other parts of the year, an increase in real gasoline prices would be expected to have a greater proportional effect on peak period demand and thus dampen the seasonal pattern of gasoline consumption.

This effect is illustrated in Figure 1-C which compares the seasonal peak of gasoline supplied with real prices by year. (The "seasonal peak" is the percentage by which June-through-August product supplied would exceed the annual average according to the estimated seasonal factors). If the hypothesis that real prices affect the seasonal pattern is correct, the figure would be interpreted as showing that the large real price increase of 1973-74 dampened the seasonal pattern and, because of lagged effects, continued to do so through the seventies. No doubt the 1979-1980 price increase served to dampen seasonality as well, though it may not be apparent in the estimated seasonal factors. The substantial decline in real prices since that time (falling about 25% since early 1981) has likely encouraged more peak-period driving, leading to stabilization in seasonality. Improving fuel efficiency, since it reduces the effective cost per mile travelled, has also contributed to this effect. As mentioned earlier, the method of seasonal adjustment used here is a moving-average technique and does not pinpoint shifts in seasonality except within a broad period. If the interpretation here is indeed correct, the stabilization of motor gasoline seasonality probably occurred somewhat later than the estimated seasonal factors indicate.

Distillate supplied's seasonal pattern is illustrated in figures 2-A and 2-B. Fairly obvious, and to be expected, is a substantial decline in seasonality over the period as heating oil's share of distillate consumption declined from more than half in 1970 to roughly 30 percent at present. This decline in share was due to a combination of conservation, switching, and increasing diesel use. In fact, the decline in seasonality is so pronounced that although 1983 annual distillate supplied was 6 percent higher than in 1970, November-to-March distillate deliveries were actually about 7 percent less in 1983-84 than in 1970-71.

Of special interest in Figure 2-A is that the apparent seasonal variation of distillate supplied has declined relatively less in recent years than previously. Most likely, near-stabilization of the level of heating use has helped to bring this about.

What implications does this have for distillate supply patterns? In recent years, declining seasonal demand, ample refining capacity, and available crude stocks have helped to reduce the typical pre-season stock accumulation. Now, with the seasonal pattern of distillate supplied apparently stabilizing and refinery utilization up, it might be concluded that typical pre-season inventory patterns have changed as well. In fact, pre-season inventory levels continue to be only a small portion of the supply picture, as will be discussed further below.

Inventory Seasonal Patterns

Inventory changes for motor gasoline and distillate, though exhibiting seasonal behavior, are much more variable than product supplied data. Figures 3-A and 3-B display the estimated seasonal factors for these series, though as discussed more fully below, these should be used only as a broad measure of seasonality.

Figures 4-A through 4-D demonstrate how variable inventory changes are compared to product supplied data. The first two compare actual peak-period product supplied by year with that implied by the seasonal factors for these two products. The remaining two figures do the same with stock changes for gasoline and distillate. The peak period for gasoline supplied is defined as June through August; for distillate, November through March. The peak period for inventory change is the highest drawdown period of the year — April to August for gasoline, November to March for distillate.

As can be seen in the graphs, product supplied seasonal factors appear to bear a reasonably close (though hardly perfect) relationship to the actual series. For distillate, weather accounts for much of what discrepancy exists. However, the inventory change data in Figures 4-C and 4-D show that the correspondence between actual and estimated "typical" stock changes, even accumulated over five months, can be quite low. Though weather effects partially explain this for distillate, much variability remains for both products. This graphically demonstrates that estimates of "typical" seasonal stock changes as estimated by seasonal adjustment are only approximate figures and should be used only as a broad measure of seasonal change.

Demand factors account for some of the variability of inventory behavior. Unusually warm or cold weather or a stronger-than-expected increase in travel directly impact inventory levels in the short run. Since inventory changes are in effect a "residual" item left after combining the foreseen and unforeseen variations in supply and demand, it is not surprising that the inventory series should contain more "noise" than the product supplied series.

A second reason for the variability of inventory changes is the flexibility of supply. It is incorrect to think of seasonal stock levels or stock changes in terms of fixed "requirements" — rather, the observed patterns represent in part efforts by individual industry members to optimize their operations within the realm of many available options. Individual refiners attempt to balance the level of refinery runs and product yields against the cost of storage and potential imports; since petroleum products are jointly produced in the refining processes, these decisions involve all products simultaneously. Flexibility among the options exist, especially when additional refinery capacity and imports are available, as they have been in recent years, and this in turn can result in wide departures from "typical" patterns. For example, for distillate, an increase of 100 MBD in refinery output and/or imports over November through March would reduce inventory draw over the period by 15 MM barrels—more than one-fourth of the actual 1983-84 drawdown.

Implications

The reduced seasonal variability of motor gasoline and distillate supplied have had varying impacts on supply developments.

At current motor gasoline annual demand levels, the reduction in seasonality for this product over the last 15 years accounts for about a 20 million barrel reduction in June-to-August deliveries, a reduction of less than 3 percent. For distillate, the impact is larger. At current annual levels for distillate supplied, a return to 1970 seasonal patterns would have implied an additional 60 million barrels of distillate for the November 1983-March 1984 period (disregarding the additional effects that the unusally cold weather would have had). If all of this additional demand had been supplied entirely from inventories, the 1983-84 stock drawdown would have been more than twice as large as actually occurred.

However, inventory seasonal patterns, as discussed above, are only part of the supply picture. Since available refining capacity and potential imports have added to current supply flexibility, the role of inventories is reduced further.

The implication of seasonal analysis of inventory changes is that, given this flexibility, estimation of a "typical" seasonal stock-change pattern is more useful as a reference (that is, as an "average"), than as a tool to explain inventory behavior in any particular year.

Figure 1-A

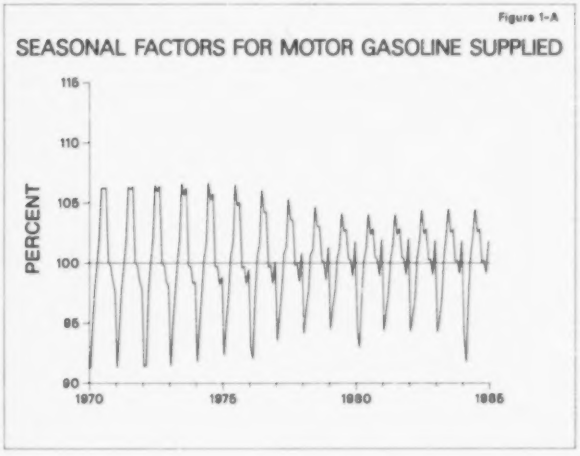

Figure 1-B

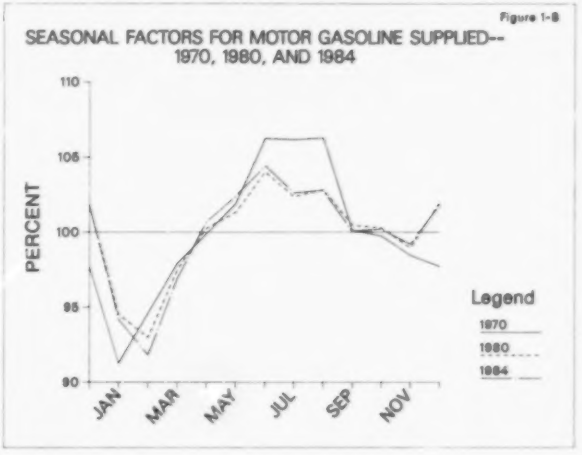

Figure 1-C

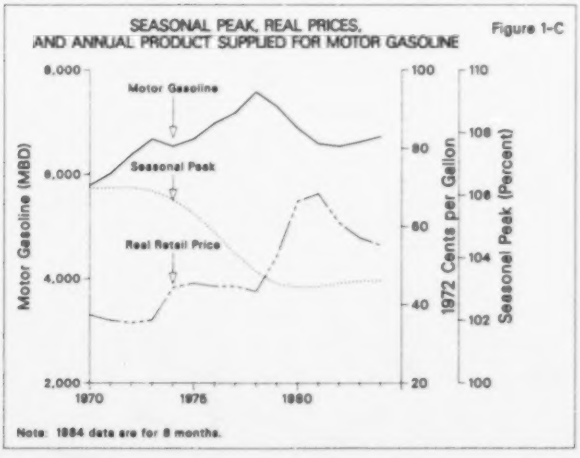

Figure 2-A

SEASONAL FACTORS FOR DISTILLATE SUPPLIED

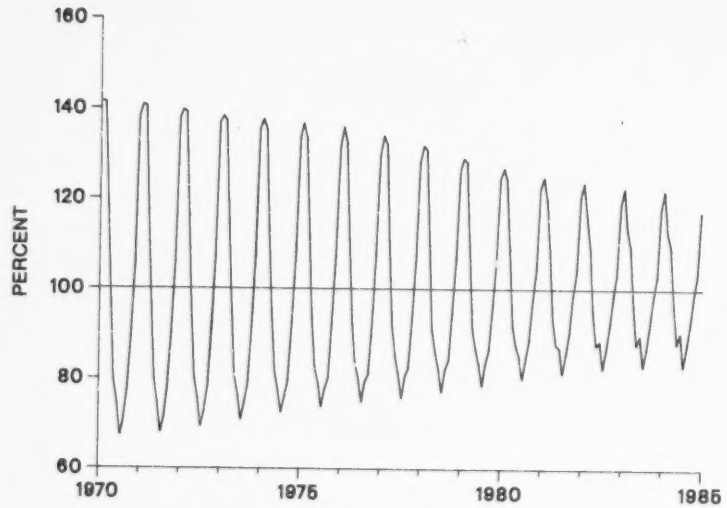

Figure 2-B

SEASONAL FACTORS FOR DISTILLATE SUPPLIED-- 1970, 1980, AND 1984

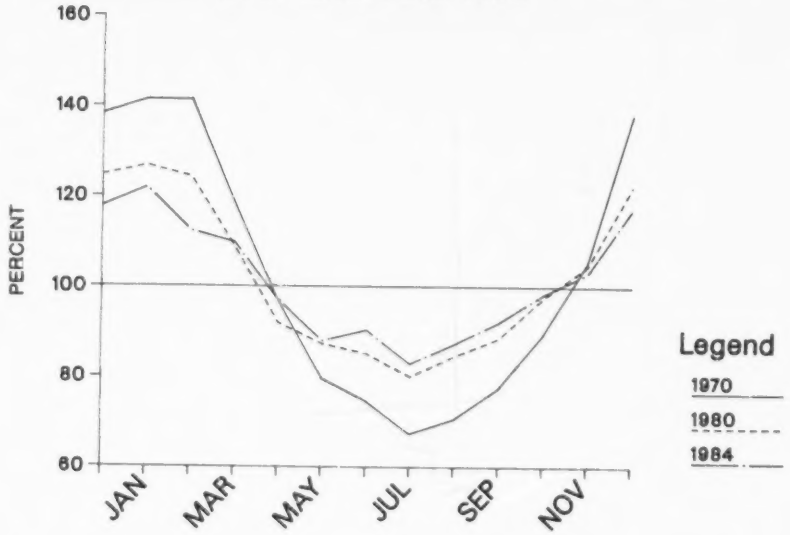

Figure 3-A

SEASONAL FACTORS FOR MOTOR GASOLINE STOCK CHANGES

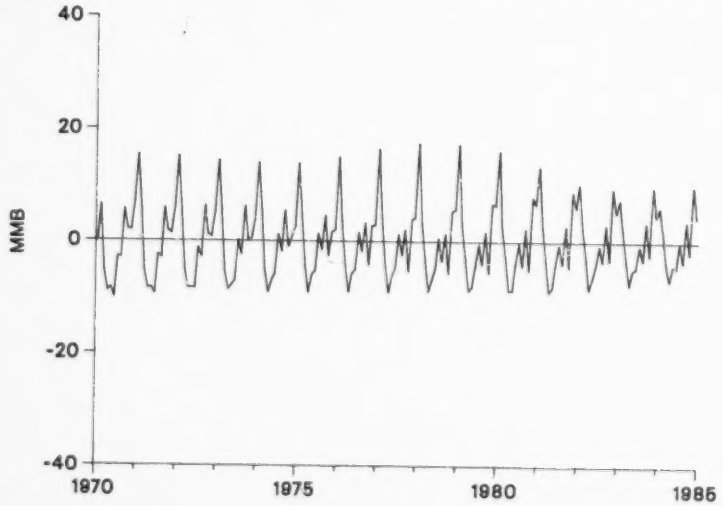

Figure 3-B

SEASONAL FACTORS FOR DISTILLATE STOCK CHANGES

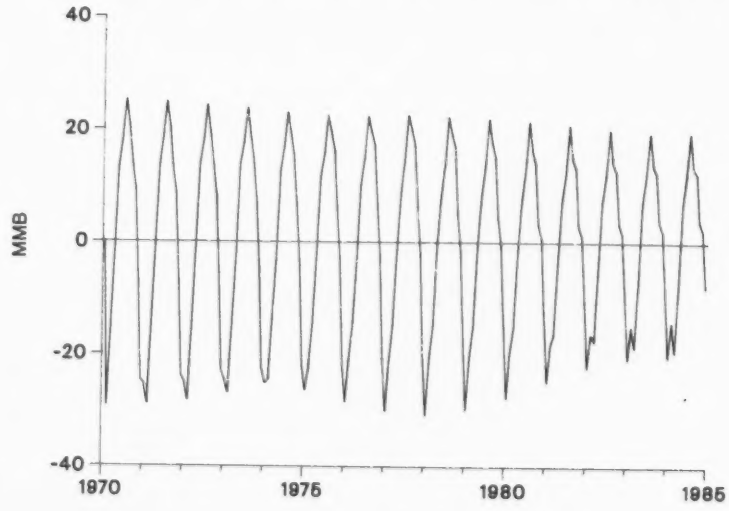

Figure 4-A

PEAK PERIOD MOTOR GASOLINE SUPPLIED-- ACTUAL VERSUS IMPLIED BY SEASONAL FACTORS

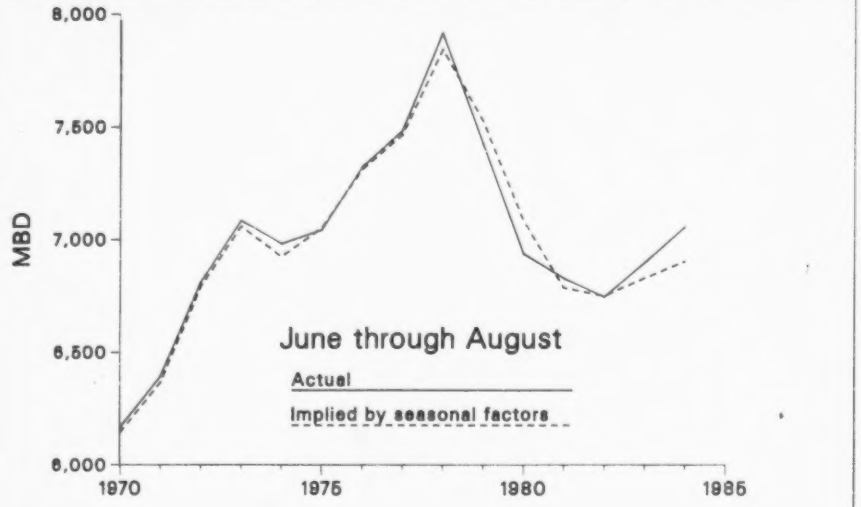

Figure 4-B

PEAK PERIOD DISTILLATE SUPPLIED-- ACTUAL VERSUS IMPLIED BY SEASONAL FACTORS

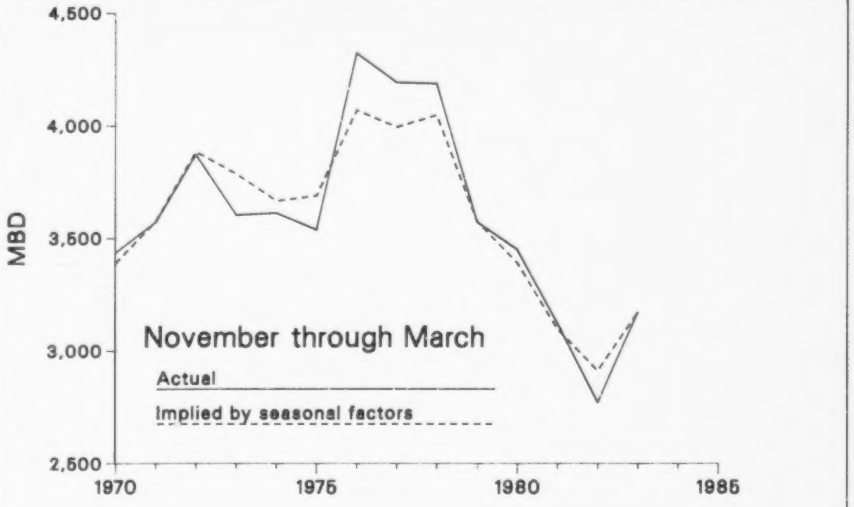

Figure 4-C

PEAK PERIOD MOTOR GASOLINE STOCK DRAW ACTUAL VERSUS IMPLIED BY SEASONAL FACTORS

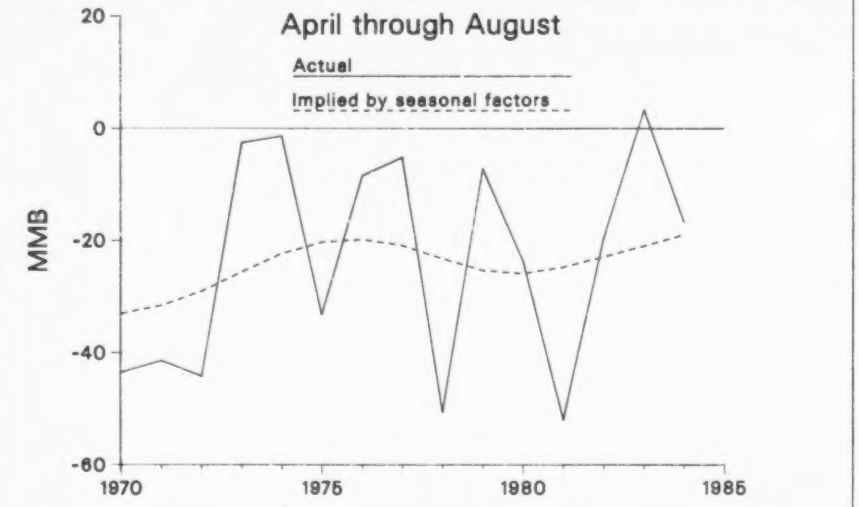

Figure 4-D

PEAK PERIOD DISTILLATE STOCK DRAW-- ACTUAL VERSUS IMPLIED BY SEASONAL FACTORS